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HISTORY OF RANGE USE

FROM

THE WESTERN RANGE—A GREAT BUT NEGLECTED NATURAL RESOURCE

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HISTORY OF RANGE USE

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THE GREAT BOOM IN RANGE CATTLE, 1880-85

The first era of intensive use of western range by livestock coincided with the great boom in range cattle, which was on the upswing in 1880. By 1881 the price recovery from the 1873 depression generated in the grazing industry a tide of expansion which became a veritable flood in 1883. That year, in Wyoming alone, 20 mammoth cattle companies were organized with a total capitalization of more than \$12,000,000 (98). Of these, the Union Cattle Co. was incorporated for \$2,000,000; and the North American Cattle Co. and the Searight Cattle Co. for \$1,000,000 each. Six others each floated stock of a half million dollars or more. Wyoming, however, was merely a representative area—the same thing was happening, or had just happened, up and down the Great Plains from Montana to Texas and across the Southwest to California. Even Colorado, Utah, Nevada, and Idaho felt the surge of this tide. In a few short years practically all ranges were under use and in many cases depletion had commenced on a scale in keeping with the size of the herds.

Outfits owning 5,000 to 100,000 cattle were common on the Plains and in the Southwest, and properties of small owners were often consolidated by purchase or by incorporation. The world-famous Santa Gertrudis Ranch of 500,000 acres near Brownsville, T^{ex}., was built up by purchased additions to the original Spanish grant of 12 secios of 4,428 acres each (118). The Swan Land & Cattle Co. was started by combining three ranch properties, totaling about 30,000 acres and 100,000 cattle, with a half-million-acre range extending irregularly from Ogallala, Nebr., westward to Fort Steele, Wyo., and from the Union Pacific Railroad northward to the Platte River (98). The XIT outfit in the Texas Panhandle ran about 150,000 head on 3,000,000 acres of land—25 miles east and west by 200 miles north and south. Hundreds of other ranches running somewhat fewer cattle, chiefly on public land, had occupied most of the range by 1883 and all of it in the Plains Region by 1885 (19). The cattle numbers by States, shown in table 26 for 1870, 1880, and 1886, indicate how rapidly the range forage was appropriated.

TABLE 26.—Cattle numbers¹ in the 17 western range States, for 1870, 1880, and 1886

[000 omitted]

State	1870	1880	1886	State	1870	1880	1886
North Dakota.....	2	70	189	Montana.....	117	622	1,050
South Dakota.....	40	136	439	Idaho.....	50	193	220
Nebraska.....	159	1,000	1,712	Utah.....	135	136	215
Kansas.....	571	1,247	2,434	Nevada.....	72	220	238
Oklahoma.....	150	552	580	California.....	1,001	916	1,258
Texas.....	4,600	4,932	8,587	Oregon.....	374	631	628
New Mexico.....	158	545	1,065	Washington.....	106	207	269
Arizona.....	30	142	502				
Colorado.....	271	809	1,356	Total.....	7,907	12,881	21,599
Wyoming.....	71	523	857				

¹ Tentative revisions of the Bureau of Agricultural Economics.

Because such immense numbers could not be run on the range without cattle of different ownerships intermingling, the managers mutually agreed to honor each other's "range rights." These "rights", for the most part, had no legal status but were respected for many years; and when smaller operators and settlers began to push in, the large outfits often used extra-legal pressure to preserve the monopoly they had enjoyed under these illicit "range rights." Original outfits with only a few hundred cattle were accepted as part of the country, but after 1883 whenever newcomers tried to enter what the established residents regarded as fully occupied range they were practically frozen out by the resident stockmen, who refused to cooperate at round-ups and other group efforts (98).

GENESIS OF THE BOOM

The buffalo, deer, elk, mountain sheep, antelope, and other forms of wildlife, large and small, that were the first users of the range had little or no discernible effect upon it in terms of depletion. Heavy use by vast roaming or migrating herds of buffalo was common, and around strategic watering places, salt licks, and on favorite breeding grounds range forage would be so fully grazed that little or no feed remained. Yet in every instance seasonal migrations of the herds permitted recovery of the vegetation between grazing periods.

In all other instances of temporary exhaustion of the range resource, such as overuse by huge colonies of prairie dogs (88), or utter destruction of forage by locusts (172), or crickets (11), sufficient periods of recuperation occurred to maintain the productive power of the original range. No evidence remains to us from those times of such persistent overuse as came when the white man began to pasture his cattle year after year on the same range, without affording any opportunity for restoring plant vigor.

The Spanish brought to their settlements in Cuba, Florida, and Mexico ancestors of the livestock destined to use much of these ranges. Stock have grazed intermittently on the southern plains since 1540 when Coronado there sought the Seven Cities of Cibola, taking with him 1,000 horses, 500 cattle, and 5,000 sheep. The period of continuous grazing began about 1700. At this time, Father Kino, a Jesuit missionary, was very active in promoting livestock raising among the missions in southern Arizona (70).

Missions established in Texas, New Mexico, and Arizona between 1670 and 1690, became livestock centers soon after 1700. It seems likely that from 40,000 to 50,000 sheep and 10,000 to 20,000 cattle were brought to Texas during the mission period. The more settled Indians of New Mexico and Arizona fostered sheep and ponies. The latter proved well adapted to range grazing, became prized Indian property, and multiplied so rapidly and were so widely distributed that by 1805 Lewis and Clark found 700 Spanish ponies at one small village of Shoshone Indians in northern Idaho (57).

California missions, established between 1769 and 1800, so prospered under the guidance of the padres that in 1834, when the 21 missions were taken from the church, they had 423,000 cattle, 61,600 horses, and 321,500 sheep, goats, and swine (58). Range use must

have been of major consequence at San Luis Rey where 80,000 cattle, 10,000 horses, and 100,000 sheep, goats, and swine grazed.

Texas proved to be especially well suited for cattle. In 1821 the Mexican Government contracted with Moses Austin to bring settlers into Texas, and many came, enticed by liberal tracts of land; and the success of Austin's colonization scheme then brought a host of requests for similar grants (100). In 1830 further American immigration was prohibited, but already about 20,000 Americans were there whose attention to cattle growing, together with the mild climate, so favored cattle that the stock multiplied to 100,000 in 1830; to 330,000 in 1850; and to 3,533,000 in 1860 (180).

With the Civil War came the first large cattle shipments from Texas to the Confederate Army. Despite the restraining influence of the northern blockade, the consequent stagnation, and the fall of prices to \$3 or \$4 a head, ideal range conditions favored still further increase, and made Texas a hive of cattle ready to swarm forth at the first opportunity. This came after the war, when currency inflation and rising prices in northern manufacturing centers, together with a decrease of 7 percent in total cattle in the United States, brought market offerings of \$40 to \$60 for beef steers (98).

The railroads in Missouri, central Kansas, and Nebraska offered outlets for these crowded Texas herds. In 1866, real drives to Sedalia and Abilene began, and in 1867 when the demand and prices were up, more than 1,000 cars left Abilene. Actual demands reached such a volume in 1871 that 600,000 cattle were driven northward to the railroad in that year. The heavy range use in western Kansas and Nebraska that began with these drives never ceased until the grass was plowed under, although dropping prices decreased the profits and hence the number of drives. By 1885 a total of more than 5 million cattle had been driven northward from Texas (98).

In a few years, however, fences began to be built, settlement was well under way, and railroads were extended into the arid region. Advance of main and branch railroads into the range country brought the market to nearby railheads. Drives were no longer necessary and, as the use of barbed wire for fencing cattle away from farms and towns became general, they were discontinued entirely in 1885. Intense range use was encouraged by the railroads, and by 1890 had been extended with their help to every nook and corner of the region.

Meanwhile the Mormons filled the Utah ranges with foundation stock which they themselves drove across the Plains, and with lean cattle and horses obtained by trading with other emigrants. By about 1880 the ranges in northern and central Utah were occupied with 160,000 Shorthorns, Devons, and Herefords (11).

With the discovery of gold in the Rocky Mountains during the sixties, cattle were taken from Utah and California into Colorado, Montana, Idaho, and Nevada. The strong markets of the late seventies and early eighties carried grazing onto most of the accessible ranges in the mountain region. Here, however, development of the country was slower and more substantial, since it came in connection with homes and farms. Wild hay and irrigated alfalfa produced abundantly and from the first lent stability to range use on a community basis.

The tremendous growth in range cattle, however, carried with it a weakness that in the end proved fatal. It was based on a husbandry transplanted from Mexico, which brought to English-speaking people for the first time in history the practice of rearing cattle in great droves without fences, corrals, or feed. The lariat, the type of saddle, chaps, and the sombrero came along with the manner of conducting the business. The very newness of it all as well as the immensity of the outfits left the Americans without guide or standard by which to gage either the security of the cattle as they roamed at large or the ability of the forages to stand up under continual intense utilization. It is little wonder, therefore, that cattle instead of grass came to be regarded as the raw resource and that the neglected forages began to give way before the heavy and unmanaged use to which they were subjected.

This almost explosive expansion of cattle grazing was based on a great natural resource which the stockmen obtained with little cost. Grass was the magnet and living bonanza that irresistibly drew cattle and cattlemen to this range El Dorado.

Like the El Dorados of precious metals, the discovery of the grass bonanza fired the imagination of cowboys, lawyers, farmers, merchants, laborers, and bankers, who rushed in to seek their fortunes, the poor by personal effort and the rich by investment. Both eastern and Old World capital, the latter largely from England and Scotland, fevered through the expectation of profit of 25, 33, or 40 per cent. A large promotion literature flourished, including such widely circulated books as Brisbin's *Beef Bonanza*. After presenting several actual cases, Brisbin showed on paper how \$25,000 would in 6 years pay all expenses and leave a fortune of \$51,278. Estimated Fortunes and Millions in Beef are significant chapter headings (21).

Since a boom was in progress, the stories were believed. Swan, of the Swan Land & Cattle Co., promoted in Scotland the corporation with the capitalization of \$3,000,000 already mentioned, and later increased this to \$3,750,000—and paid a few dividends from the capital (98). Some companies really did make money for a while, but lax methods accompanied this "easy" money. Cattle were bought on "book" count, and newly purchased cattle were seldom counted. Purchase prices soared, because purchasers bid against each other, and because of the buying of breeding stock whose offspring started other breeding herds, most of which never went to a consumer market but accumulated as capital inventory until the collapse of 1886.

THE COLLAPSE OF THE BOOM

The expectation of fortunes to be made in a few years led to gambling in futures and caused overexpansion both in investments and in range use. In this process the accumulated forage of several years was mined, overuse taking not only the current growth but sapping as well the vigor of the forage plants. The better stockmen recognized the danger (98, 138), but warnings in a minor key during a boom get no hearing, and exploitation raced on.

This constant drain, without allowing any chance for recuperation, caused the forage "mine" to peter out. In 1898 Bentley (16) reported that some stockmen considered that in parts of Texas "the injury has gone almost past the point where redemption is pos-

sible." Ranges that should have carried a cow on every 40 acres had one on every 10 acres.

While this dangerous process of depleting the ranges by overuse and by too early and too continuous grazing was going on, scarcely anybody was making provision for supplementary feeding or for setting aside winter ranges. Neglect of cattle diseases, too, made the risks still higher. All business was conducted on the basis of open winters, notwithstanding the fact that Shorthorns brought from the farms of the East and Texas stock arriving in late season did not go through the first winter safely. Investors, believing implicitly in the security of their capital, did not realize they were "betting against God Almighty and a sub-Arctic winter" (98).

Whole fortunes, either owned or borrowed, and speculative loans of millions each were all staked on cattle. With no source of income save cattle, the stakes were high and the risks breath-taking; but since it was a boom, men were irrational. The waste, too, was exhausting; cowboys, fully employed only a few weeks at roundup and branding, lived during the winters mostly at the expense of the ranch owners.

And just at this point nature spun a "double blank" and collected the stake. The winter of 1885-86 was severe from Kansas southward to Texas and New Mexico. Osgood says 85 percent of the cattle were killed in some areas. In the north the summer of 1886 was hot and dry, grass was short, and cattle were forced on the market at reduced prices. In November an Arctic winter set in; snow was deep; blizzard followed blizzard; the chinook was followed at once with snow. Young stock fresh from the East and from Texas died in great droves, with a mortality of 40 to 60 percent (40). Ranges were so closely cropped that cattle losses would have been heavy in a mild winter, but with severe cold and deep snow, the lack of feed was economically fatal to many stockmen, especially to the speculatively financed corporations. The somewhat inaccurately recorded numbers of assessed cattle in Montana decreased from 663,716 in 1886 to 471,171 in 1887; in Wyoming from nearly 900,000 in 1886 to just over 750,000 in 1887. Financial confidence, which started to wane in 1885, was almost completely lost, and the winter of 1886-87 gave a body blow to the beef bonanza. When the depression caused loans to be called, credit liquidation brought forced sales and bankruptcy.

Starvation of cattle followed severe droughts in the Southwest in 1886 (75), in Colorado in 1888-90, in the Plains and Southwest in 1893-94; in the Coast States in 1898-99, and from Montana to Arizona and New Mexico in 1901-4.

RECOVERY—STRIVING FOR SECURITY ON THE CATTLE RANGE

So weak had the boom structure been and so severe the shock of its fall that only a wreck of the range-cattle industry remained. Range use had been so concentrated and relentless that the best coulees were hopelessly trampled, and the back slopes weakened in productive power. Herds were broken and scattered; confidence was wiped out; and forced sales for liquidation of debts pressed down the already broken prices. Cattle which were worth \$9.35

per hundredweight in 1882 at Chicago brought \$1 in 1887 (19). Naturally, the outfits supported by foreign capital, without the personal care of a vitally interested owner, suffered most; the "cattle barons and bovine kings faded out of public interest." On the other hand, those to whom cattle raising had been more than a wild adventure for big stakes fared best.

While the range was used recklessly by most ranchers, the necessity for providing a dependable forage supply was felt, even before the ruinous winter of 1886-87, by a few stockmen who had purchased land in an effort to prevent summer use of range suitable for winter grazing (98). Others, realizing that controlled ranges had advantages, were willing to relinquish their "rights" and persuaded the national convention of Cattle Growers to recommend Federal leases on the public range (33). Before the boom, in 1881, stockmen of both Montana and Wyoming fought against enacting the law suggested by Powell for enlarged "arid homesteads", and urged that all proposals to lease land be rejected; but after the boom they felt differently about the situation (107, 176).

No action on this recommendation was taken by the Federal Government and the cattlemen then attempted to acquire ownership of as much land as possible. Cowboys were hired to enter land and for a small sum turn it over to their employer. Lands along streams where cattle could water and where wild hay could be grown were acquired first, and later more and more upland range (98).

Windmills, which came to be widely used for pumping water to range at a distance from streams, added another expense, but it was evident that adequate forage must be assured. Cattle yards and loading and sorting chutes were erected. Also ownership of land was accompanied by higher grades of livestock; purebred bulls (Shorthorns at first, but after 1887 Herefords, which had proved more hardy and also earlier in maturing) were introduced (118). This use of better stock was in turn accompanied by the use of shelters; death by starvation or by exposure of a Texas cow worth a few dollars had not been serious, but that of a \$200 or a \$300 bull was avoided by providing shelter and feed, and thus the combination of hard winter and market collapse changed the range-cattle industry from an adventure into a business.

From this point on, the history of the range is largely the story of the struggle between the big owner and the little owner, with the cattle "rustler" as an unrecognized but inevitable ally of the small owner. The Wyoming Stock Growers' Association was strong enough to blacklist cow hands who had herds of their own, and even certain of its own members, but a rustler on trial often had an accomplice or several sympathizers on the jury. Since convictions were impossible in these cases and the association was strong, a lariat on a cottonwood brought swift justice. Although the association unduly prolonged its "vigilante" efforts after legal justice was provided, it cannot be denied that it did much to put down cattle rustling, and kindred practices.

The land homesteaded by cowboys to add to the big ranch was in many cases so located along the streams as to prevent another stockman's cattle from drinking. Larger outfits sometimes in this way covered all the water courses in the vicinity and by entering a few

quarter sections they obtained control of many thousands, sometimes hundreds of thousands, of acres of Federal land (180). Agreements among the big stockmen not to cooperate with newcomers in round-ups and other group activities, in a concerted effort to squeeze them out, aroused resentment.

Affairs gradually assumed a state of social warfare, culminating in 1892 in the "Johnson County war", when the association undertook to punish the residents of Buffalo, Wyo., for "harboring and abetting suspected rustlers." Several men were killed; the Army Reserves were called out; and arrests of well-known cattlemen followed. Although the matter was hushed up, the big stockman's range monopoly was effectively broken; law and justice were hereafter applied with some show of impartiality to operators of small and large outfits (98).

After this, contention decreased and progress in peaceful settlement made headway. The industry was not, however, to ride an even keel, for cattle values which had reached another crest in 1898 tumbled so rapidly that in 1905 they were only a little over half the 1898 figure. After this there was a slow recovery until the European war again brought high meat demands and soaring prices.

INCREASE IN SHEEP ACCENTUATED BITTER STRUGGLE FOR RANGE

Just when security in the ownership of cattle was becoming established and the West was being taught the necessity of welding land to livestock to insure dependable forage supplies and range use, a tremendous and rapid increase in sheep again stirred up the struggle for range.

Sheep numbers quickly rose from a comparatively small figure to veritable hordes. This increase came at different times in different States, but maximum numbers were reached in most States between 1880 and 1910. In California the gold boom brought an increase from about 1 million in 1859 to 4.1 million sheep in 1870 and 6.9 million in 1880. New Mexico sheep reached their peak number in 1882 with 5.2 million and Texas an early peak in 1884 with 5.7 million. From a few hundred thousand in the early eighties the sheep in Utah increased to nearly 2.9 million in 1901, in Idaho to about 2.6 million in 1903, in Montana to 5.7 million in 1903, and in Wyoming to 6 million in 1909.

Vast numbers of sheep appearing almost without warning on fully used cattle ranges not only aroused a deep resentment but had a dire effect in causing even further exhaustion of the range forage. Compact herds left the range plants shaved to the ground and the soil exposed to wind and water erosion (185). Also sheep were crowded right up to ranches and settlements, and since cattle fences did not keep out sheep, sometimes even hay fields were invaded. Even more destructive of range than the ordinary wool herds were the bands of wethers, which could outdistance ewe herds in the race for feed.

Cattlemen resorted to force in many localities, sometimes scattering bands of sheep, sometimes driving them over precipices, and in some places setting up dead lines that sheepmen were warned not to cross. But herders and owners of sheep were robust frontiersmen, and sometimes when a particularly aggressive herder was threatened

firearms were used, and the cattle-sheep feuds waxed hot. Throughout the West there were many such feuds, some of which resulted in as many as 30 deaths (12), and only after both cattlemen and sheepmen were convinced by the community that violence brought retribution to both contestants did the feuds cease.

The outcome of such a relentless contest for range was complete utilization of forage; the only way to prevent another outfit from obtaining a given range was to strip it utterly naked. To make conditions still worse, this plant spoilage struck at the very foundation of the range resource by furthering the loss of the most productive soil—the friable, humus-bearing surface layer.

After 15 or 20 years of such exhausting range use the better forage plants succumbed on great blocks of range; in other areas their vigor was so reduced that growth was dwarfed and belated until there was little top growth and no seed crop (115).

Depleted and restricted ranges, with the resulting increased expenses, skimmed off most of the profit (133). Wool prices dropped during the early nineties and again just after 1910 (36). Sheep, therefore, declined during the nineties in California and Texas, during 1901–5 in Utah, and during 1910–20 in some of the other States, but in 1920–29 there was a rather large increase in several of the Mountain States.

The decreased value of wool and the rising demand for lambs brought about a marked reduction in wethers and consequently eliminated the worst form of range use. After 1915 herds consisted largely of ewe-breeding stock; when 3 or 4 months old all the wether lambs and half the ewe lambs were sold (133).

The market-lamb industry, with its heavy investment in good breeding herds, and the range-use difficulties forced the sheepmen to seek sure feed. Shortly after 1900 national-forest permits began to assist greatly; some private land was leased and some was purchased (133). The sheep industry then took on two distinct aspects: (1) Market lambs as a major product, supported by heavy investments in land and facilities; and (2) wool and range lambs combined, with a small investment. Though use of range on the national forests hastened the combining of the land with sheep, this was a phase of the evolution of the industry and would have come about in any case.

Two results thus arose from the use of owned land: (1) Transient, nomadic outfits decreased in number; (2) range use was in part limited to the grazing of a definite area, supplemented by feed from cultivated land.

In Texas, in the Southwestern States, and in Oregon the problems of sheep grazing were further complicated by the increase in Angora goats. The first importation came from Turkey in 1849, and another in 1860 (109). Increase was at first slow, but about 1910 it took on real proportions. Texas had 248,000 goats in 1898, 1.7 million in 1909, 2.2 million in 1922, and more than 3.2 million in 1930 (1).

On Edwards Plateau in Texas, the area of greatest concentration, cattle and sheep were grazed in fenced range pastures before goats came in. At first it was thought that goats might benefit a range by holding brush in check, but in time the better forages decreased and the poisonous bitter rubberweed increased.

Goats are run in smaller numbers in New Mexico, Arizona, California, Utah, and Oregon, where they graze on rough, brushy areas;

but when herded closely, often by alien owners, they have in many cases stripped the range of nearly all vegetation. Such forage depletion does not occur, however, when the goats are handled in open herds on properly stocked ranges.

The increase in sheep and goats was in part compensated for by a decrease in horses. Indians and settlers had numerous ponies, which, along with the bands of wild ponies, constituted a major range use until about 1908, when stockmen and settlers began rounding them up and shipping them out (60). Shooting wild ponies also was a regular practice on some ranges. The reduction of farm horses by motorization has decreased range use by horses still more. However, the gain by the decrease of horses was not nearly equal to the increased demand by sheep and goats.

SETTLEMENT INTENSIFIES TENDENCY TO RANGE DEPLETION

Settlement, which sometimes preceded and sometimes followed the influx of sheep into a locality, markedly intensified the severity of range use. Encouraged by land booms, by high prices for cereals, by railroads, and by a few favorable seasons, crop-growing was pushed far beyond the line safe for tillage (94). Believing that cultivation brought increased rainfall and encouraged by a few years with more than average rain, the settlers turned good short-grass range wrong side up and ruined it for grazing.

Crop growing became successful on part of this land, but the venture often failed in the long run unless irrigation was practiced. A few inches below the surface of most soils was a hardpan largely impervious to plant roots, and the soil above was not deep enough to hold much moisture (178). Nevertheless, these precarious lands were oversettled, only to be abandoned in a few years. In western Kansas there was a succession of such waves of settlement a generation apart.

The most productive range lands were ripped up for wheat or corn, thereby decreasing both the acreage and the acre-yield of forage. Between 1880 and 1899, 104 million acres were taken for crop growing, largely on the Plains. Settlement served both as means of reducing range and also as a means of producing hay and cereals which tended to furnish a more stable feed supply. As the range area decreased, range use by resident stockmen was concentrated on the unplowed area with resulting overutilization, a condition accentuated by the settlers' farm stock.

In the mountain region settlement took place almost entirely on "spring-fall" range, already the least adequate of the three seasonal ranges. Livestock were crowded upward into the lower edge of summer range on the one hand and out to the winter ranges on the other (133). Use of the summer range at the wrong season did great injury by exposing the best forages to too early grazing, and the winter range, with only a sparse plant cover, suffered from being grazed in the fall and spring periods of recuperation.

Not all settlement influences, however, were harmful to the range. Irrigation to increase forage production is the natural complement of grazing in an arid region. Alfalfa growing began in the fifties in California, whence it spread eastward to Utah before 1860 and

from there to Colorado about 1185 and to Montana about 1890. By 1909 more than 6,000,000 tons of alfalfa hay were produced in the range States, much of which was used to supplement range forage. Only 1 to 2 percent of the land area was growing alfalfa, but the yields were 5 to 10 times as great as those from native forages. Moreover, alfalfa hay was unusually rich in proteins and minerals, and thus made an unexcelled feed supplement for grazing stock (135). Stubble fields and irrigated pastures made the handling of livestock more convenient and strengthened the animals by furnishing a variety and abundance of feed for a few days or weeks as the animals moved from one seasonal range to another. Stockmen could depend on a definite food reserve to tide their animals over emergency periods of food shortage such as are occasioned by severe winters or by prolonged drought.

The practice of feeding hay and grain to livestock increased rapidly in the Plains States after the severe winter of 1886-87, and in the Southwest after the drought of 1891-94. The total supplemental feeds, including irrigated pasturage, furnished to livestock increased in the range part of the Plains States from 5 percent of total forage eaten in 1890 to 17 percent in 1910; in the 11 far-western range States such feeds increased from 12 percent in 1890 to 40 percent in 1910. In 1935 these feeds constituted 29 percent of the total forage in the Plains States and 43 percent in the 11 Western States. Such rapid increase in the practice of feeding grew out of heavy winter and drought losses which resulted in part from the depleted ranges and in part from the absence of any provision for suitable reserve range for use in winter or during dry periods. Breeding and other animal husbandry practices brought great incentives for feeding the more valuable animals. The small area of many ranches also tended to favor feeding as opposed to grazing.

As a result of the limited areas of land that could be taken by homesteading, varying from 160 to 640 acres, most settlers who became stockmen obtained holdings much too small and frequently too nearly submarginal for family support. The more fortunate ones were able to purchase more land, but the great majority struggled along with one homestead and whatever public range they could salvage, which early became very limited and consequently seriously overgrazed. This vast number of too-small holdings was concentrated near larger irrigation projects, where the high cost of irrigation water and of preparing the land for irrigation frequently limited the size of such farms to 20 to 80 acres, too small an acreage to permit much farm pasturage.

One of the worst phases of the settlement of the better range land by small ranchers and farmers was the bitter struggle over land use which it engendered. Corporate livestock outfits sometimes obtained legitimate ownership control of streams and springs, but more often, as we have seen, they depended on intimidating the settler who came with just enough capital to make a humble beginning. Soon the settlers entered land along the streams inside illegal enclosures. The cropper fenced his grain field and garden, turned his animals out to graze, dug a canal, and put in a diversion dam. One day his cattle disappeared, his fences were cut, the canal broken, or the dam demolished. Suspecting the stockmen, he retaliated by killing or driving away cattle or by cutting the drift fence.

When sheep outfits crowded in upon the isolated settlers or upon a small irrigated community, the sheep seldom left much forage for domestic farm stock, making it necessary to feed teams and milk cows the entire year or else provide irrigated pasturage. This the settlers considered decidedly unfair (94). This three-cornered fight among cattlemen, settlers, and sheepmen was a complex pattern of bitter feelings, especially when a huge incorporated stock outfit was involved. Worst of all, it put a premium on forestalling another outfit, and stripping a neighborhood nearly bare of forage in order to keep out a competing user.

This competition led to increased operating expenses and to investment expenditures the purpose of which reached beyond forage management. Heavy investments in land, buildings, fences, water developments, and miscellaneous supplies were made to provide shelter, feed reserves, pasturage, and better grades of livestock. However, little or nothing was spent for management of ranges, a phase in urgent need of improvement.

The serious effects of poor range management were increased in many sections by fires, particularly in California, where forest and brush fires have played an important part in molding and shaping the vegetation. Historic evidence and the reconstructed story through fire-scarred tissue on century-old trees indicate that fires frequently swept forest and foothills alike. But the damage caused by these presettlement fires was less serious because nature in her own way slowly started anew the process of rehabilitation and building back to climax vegetation. Once civilized men entered into the picture, fires increased in number and restoration was indefinitely retarded. The miner, the early sheepman, and the careless traveler all contributed annually to the inevitable smoky skies and burned forests (128, 145). The net result was the extension of vast areas of chaparral, chamiso, and other brush areas of lowest forage values, replacing on the upper elevation coniferous forests and on the lower levels the more open parklike woodland and savanna types. In this process grass and herbs were replaced by undesirable woody shrubs, which in repeated fires of the timber type produced forage for a short period, followed in a few years by impenetrable thickets of manzanita and ceanothus. On areas where fires were used freely and where overgrazing followed, perennial grasses frequently were replaced by a host of "immigrant" annuals from the Mediterranean region of much lower forage value.

ESTABLISHMENT OF PUBLIC-LAND CONTROL A STABILIZING FACTOR

The creation of the national forests, on which are grazed 12 percent of all the cattle and 23 percent of all the sheep in the West, greatly stabilized range use and livestock production. An effort was made to administer grazing on the national forests for the benefit both of the permanent stockmen and of the adjacent agricultural communities. Having a definite range allotment with 3 to 5 months of dependable summer feed of high quality helped the stockmen to make the adjustments necessary to supply feed for the remainder of the year.

Prior to 1930 some organized attention was given to the principles of range management on northern Indian lands. In 1930 responsibility for the supervision of all grazing was delegated to the forestry branch of the Indian Service, and a distinct forward step was taken by inaugurating a plan of management similar to that developed on the national forests.

The Taylor Grazing Act of 1934 provided authority to administer 80 million acres, or about half the public domain, and made possible a step toward the management of the grazing on these lands.

Recently wildlife and game management have come to the front in the national forests as problems to be correlated with grazing. Recreation, both on national forests and on national parks, has also increased greatly in importance since automobiles came into general use. The parks, as reservoirs for wildlife, have become much better known than formerly. Under the previous near absence of control, game and other wildlife in the country as a whole decreased to small populations, whereas under the unplanned protection used in the West from about 1915 until recently game became so congested in some areas as to require serious attention. It is likely that use of the range by game will increase in many places, but under good management it need not conflict in an important way with livestock grazing.

Both game and recreation have such high public values that they will undoubtedly receive preference in the use of small areas of range land especially suited for these purposes.

WORLD WAR BOOM AND POST-WAR DEPRESSION BRING HEAVY DEMANDS ON RANGE

The participation of the United States in the World War again intensified range use by bringing about a great increase in numbers of livestock, stimulated by rising prices and by war demands for increased food production (66). In 1918-19, the number of animal units in the Nation was the highest ever attained (18), and by 1920 a great potential meat surplus had been built up. This important increase in numbers of livestock had the effect of speeding up depletion.

The additional stocking, together with dry seasons, proved a heavy blow to the program of range management on national forests. The national-forest administration responded to these urgent national demands and in 1918 allowed 1,063,000 extra animals to graze on the forests, receiving them earlier in spring and keeping them later in the fall (60). Justification for it lay in the fact that, although the ranges were being depleted, it was difficult to supply the meat demands of the war period. In addition there was the desire of stockmen to benefit by the high war prices. In places the damage done to the national-forest ranges has not as yet been fully repaired.

Also between 1910 and 1929, but mostly after 1915, some 50 million acres of range land, largely on the Great Plains, was plowed up for dry farming by a horde of new farmers. Later many of these farms were abandoned.

During the World War and in the post-war inflation period, as in the boom of 1883, the easy credit available led to overborrowing.

Owners were making so much paper profit that overinvestment in livestock, land, and improvements resulted. From March 1920, scoured wool dropped from \$2.05 a pound to 26 cents in August 1921, and as a result sheepmen lost heavily by liquidation and foreclosure (133). Wool and sheep prices recovered markedly during 1922 and 1923, but cattle prices on the Chicago market dropped from more than \$21 a hundredweight in 1919 to just more than \$9 in 1921 and 1926, entailing a long period of deflation in cattle values and heavy losses during liquidation of assets. Afterward, along with other industries, all livestock prices rose sharply to the 1929 crest.

In 1930, the mortgage debt was 35 percent of the total value of outfits, and this percentage mounted rapidly during the depression, owing to shrinkage in land and other values (?). As in other industries mortgages were often larger than the current value of property. "Paper" on livestock was also extremely prevalent, practically all outfits being heavily mortgaged in order to buy feeds during the drought. Inability to pay brought an increase in delinquencies and foreclosures. In 1932 the eleventh district of the Federal Land Bank alone had taken over 706 farms, valued at more than \$3,500,000, despite the fact that banks were trying to avoid foreclosure on farms and ranches.

The break in livestock prices prevented disposal of livestock at a price that even approached production costs. With lambs and ewes bringing only a dollar a head in many range localities, and with no market at all in many others, sheep numbers greatly increased. A similar condition prevailed in the cattle industry. In spite of the increased numbers of livestock on the range, much less supplemental feed was purchased than in ordinary times, and forage yields reduced by drought were woefully inadequate to the demand for range feed.

DROUGHT ADDED TO EXCESS STOCKING WORKS HAVOC ON RANGE

The drought of 1930-35, culminating a 10- to 15-year dry period, has given another tremendous setback to range forage production, already reduced as a result of previous long, severe, and nearly unrestricted use. The heavy load imposed by World War increases in range livestock had barely begun to lighten, when the slump in livestock prices and the drought combined to increase use and reduce forage production (66).

Throughout the whole history of range use the forage has been heavily used and at intervals severely so. The livestock industry at times has been badly shaken. Always, however, the industry has been able to go on, in part because of the remarkable ability of the range to recover at least a part of the values lost.

In spite of heavy use over a period of many years, the range has not been destroyed, although it has been greatly weakened. With normal precipitation, growth was increased and the splendid sod grasses at least partly refilled the bare spots. Where the grasses were killed, the ground was occupied by other plants which, though of lesser palatability and smaller forage value, the animals still ate. The recuperative powers of the better ranges are so high that their capacity to support livestock has on the whole decreased slowly.

The livestock industry also has shown a great power of resilience. After each shock of depletion, drought, or depression, new feed supplies have been found, at first by seeking new ranges, but later by growing hay and other forages and by supplementing range forage with grain, cottonseed meal, and other concentrates. Improved breeding of livestock and other adjusted production practices also helped to offset the increased feeding and other management costs. In spite of range depletion, the livestock industry has managed to survive, though usually loaded with increasing expenses.

ISSUES GROWING OUT OF RANGE-USE HISTORY

The history of range occupancy and settlement as summarized in the previous pages indicates five issues that require earnest consideration.

DROUGHTS

History records disastrous droughts in 1886 in the Southwest; in 1888-90 in Colorado; in 1893-94 in the Plains and Southwest; in 1898-99 on the Pacific Coast; in 1903-4 from Montana to Arizona; in 1917-18 in the Southwest; in 1923-24 in the Southwest and Idaho; and in 1930-35 practically all over the range country. Although this record is not complete, it shows that intermittent drought is an inseparable problem of the range country. Since it can be neither avoided nor prevented it must be foreseen, perhaps predicted, and at all events provided for. Although determining the most feasible economic method of doing these things is no small undertaking, it is one that must be attempted.

DEPLETION

As already seen, depletion of the range forage began to be of major consequence during the boom of the eighties. Between 1890 and 1910 sheep and cattle exhausted the vigor of forage by repeated close cropping, and oversettlement trimmed away great blocks of the best range. While the conflict between large and small operators, between cattlemen and sheepmen, and between settlers and stockmen for possession of the range intensified its use in no small degree, depletion, literally everywhere present, weakened the position of the livestock industry. On top of this came the immense increase in animals in the war years and the debilitating effect of protracted drought, bringing stockmen to the verge of despair. History indicates that the current of depletion, which still runs strong, will continue to do so as long as present conditions are allowed to exist. With large areas 50 percent and some others 75 percent depleted, it is not too much to predict that the range will become almost destitute of forage unless a determined, unrelenting effort at restoration is begun at once.

NEED FOR BASIC TECHNICAL KNOWLEDGE

The history of range use is in part a story of failure to conserve forage supplies; to restore depleted ranges; to plan land use; to pre-

pare for drought; and to avert the effects of depression. There is an obvious need for gathering and applying new knowledge on which to base an effort to solve these problems.

TOO-SMALL RANCH UNITS

History has also disclosed the part that subdivision of land in ill-advised efforts to encourage settlement of unsuitable or too limited farm and range units has played in range depletion. These past errors in land use are not repaired by mere abandonment of farms. Further, they are thwarting efforts at progress in land planning and now rise up to plague us as problems in submarginal lands and in the resettlement of population. Some means must be sought of repairing past errors and of avoiding those likely to arise in the future.

CYCLES OF BOOM AND DEPRESSION

Stockmen have repeatedly been at the mercy of drastic price fluctuations. Breeding herds bought at high prices during a boom have led to a surplus of cattle and sheep which has accentuated the price decline after the peak (177), sometimes lowering it to a third of the boom value. At five different periods, the forced sale of cattle on a shrinking market made prices per head out of all proportion to costs built up largely in a period of high prices, causing debts incurred during the up-phase of the price cycle to be a double or a triple burden. The Farm Credit Administration has worked on a solution of the credit phase of this recurring difficulty.

Each of these unfavorable consequences of range use is presented in detail in this chapter.



